

REMARKS

Claims 1, 2, and 7 are presented for further examination.

In the Office Action mailed April 25, 2003, claims 1, 2, and 7 were rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of U.S. Patent No. 4,473,596 ("Beerwald et al.") in view of U.S. Patent No. 4,877,938 ("Rau et al.") and newly-cited U.S. Patent No. 6,253,703 ("Echizen et al.").

Applicants respectfully disagree with the basis for the rejection and request reconsideration and further examination of the claims.

Cited References

Beerwald et al., U.S. Patent No. 4,473,596, teaches a plasma method for coating the inside surface of a glass tube by a reactive deposition from a gas flowing through the tube. In an embodiment of the invention illustrated in the accompanying drawing of Beerwald et al., Beerwald et al. teaches the plasma zone 6 is produced by means of microwave power. The entire microwave apparatus, which consists of a magnetron 7, a unidirectional transmission line 8, and a plasma-producing device 9, is moved to and fro over a tube length of one meter at a rate of four times per minute.

In the remarks, the Examiner states that the drawing in Beerwald et al. shows the longitudinal axis of the waveguide perpendicular to the cylindrical axis and does not intercept the slit and does not bisect the resident cavity. Applicants respectfully disagree with this observation. There is no teaching or written description in Beerwald et al. that this is what the figures illustrate. There are no dimensions or scale drawings of the device depicted in Beerwald et al. Moreover, the figure in Beerwald et al. is not a photograph containing an exact reproduction of the object. Rather, Beerwald et al. is merely a schematic that does not clearly teach or suggest the longitudinal axis of the waveguide formed perpendicular to the cylindrical axis or that the longitudinal axis does not intercept the slit and does not bisect the resident cavity.

Moreover, Beerwald et al. must be assessed in its entirety by one of ordinary skill, and a comparison of the disclosure with arbitrary parts taken out thereof to suggest coincidental agreement between the figures does not support obviousness. In addition, Beerwald et al. is not only totally silent on the function of the position of the longitudinal axis of the waveguide with

respect to the cylindrical axis, it also does not teach or suggest the interception of the slit and the bisection of the resonant cavity.

Rau et al., U.S. Patent No. 4,877,938, teaches a method for coating the inside of a tube by reactive deposition of a material from a gas mixture that is passed through the tube. Deposition is activated by a plasma that is reciprocated in the tube and is produced by microwaves. As discussed in previous amendments and responses to office actions, the object of Rau et al. is to provide a method with low energy consumption in which the plasma is excited by TE-011 resonance in a cylindrical resonator (see column 2, lines 48-54). Rau et al. achieves this objective with a device in which the ratio of the diameter to the height of the microwave resonator is determined by the TE-011 resonance in the microwave resonator. Moreover, the length of the resonator corresponds approximately to one-half a vacuum wavelength (see column 2, lines 15-16). Rau et al. fails to teach or suggest a construction of the apparatus according to the present invention, *i.e.*, an elongated microwave guide that emerges into a resonant cavity that is substantially cylindrically symmetric about a cylindrical axis, the guide having a longitudinal axis that is substantially perpendicular to the cylindrical axis and that does not intercept the slit and does not bisect the resonant cavity.

In addition, Rau et al. fails to teach the relationship between the microwave radiation having a vacuum wavelength λ and the slit having a width W . Rau et al. does teach that the resonant frequency depends on the overall length of the inner resonance space (see column 3, lines 43-45), which relationship has nothing to do with the relationship as mentioned in the present invention.

Echizen et al., U.S. Patent No. 6,253,703 B1 relates to a microwave chemical vapor deposition apparatus suitable for forming a deposited film on a substrate. As shown in Figure 1, a rectangular waveguide 21, a cylindrical cavity resonator 22, a plunger 23 for varying the length of the cavity resonator 22, and a microwave reflector 26 in combination with a film-forming vessel 27, a substrate 28, a substrate holder 29, and gas introducing pipes 30 and 31 are taught. The cylindrical cavity resonator 22 and rectangular waveguide 21 are joined together with the axes thereof intersecting each other at right angles. The cavity resonator 22 is provided

integrally with two matching circuits, namely, the plunger 23 for varying the length of the cavity resonator 22, and the cylindrical sliding matching irises 24 (see column 6, lines 40-47).

It is noted that the MW-PCVD apparatus shown in Figure 1 does not teach or suggest and has nothing to do with the apparatus of the present invention. The apparatus according to Echizen et al. cannot be used for the deposition of one or more layers of silica on an elongated vitreous substrate. In addition, the apparatus according to Echizen et al. fails to teach an inner cylindrical wall comprising a slit that extends in a full circle around the cylindrical axis along which axis the substrate can be positioned.

In accordance with the teachings of Echizen et al., there is no guide having a longitudinal axis that is substantially perpendicular to the cylindrical axis and which does not intercept the slit and does not bisect the resonant cavity.

Discussion of Claims

Claim 1 teaches an apparatus for performing plasma chemical vapor deposition whereby one or more layers of silica can be deposited on an elongated vitreous substrate. The apparatus of claim 1 is recited as comprising an elongated microwave guide that emerges into a resonant cavity that is substantially cylindrically symmetric about a cylindrical axis along which the substrate can be positioned, the cavity being substantially annular in form with an inner cylindrical wall and an outer cylindrical wall, the inner cylindrical wall having a slit that extends in a full circle around the cylindrical axis and the guide having a longitudinal axis that is substantially perpendicular to the cylindrical axis and which does not intercept the slit. Claim 1 further recites the slit having a width, W , the elongated microwave guide configured to deliver microwave radiation energy to the resonant cavity where the radiation has a vacuum wavelength λ , a width W , and the slit size to satisfy the relationship $W \leq \lambda/10$.

As discussed above, neither Beerwald et al., Rau et al., nor Echizen et al., taken alone teach or suggest the claimed invention. In addition, the combination of Beerwald et al., Rau et al., and Echizen et al. is not justified or suggested in either one of the references or in any combination of the references separate from applicants' disclosure. Even if one were motivated to combine the references as the Examiner suggests, the combination would not be physically possible or operative because the microwave plasma CVD apparatus according to Echizen et al.

cannot be used for the deposition of one or more layers of silica on an elongated vitreous substrate. Even if one were motivated to combine the references as the Examiner suggests, the combined teachings do not show all of the disclosed and claimed features of the invention. These features include the longitudinal axis of the guide formed substantially perpendicular to the cylindrical axis and not intersecting a slit formed in a full circle around the cylindrical axis, the slit having a width W , the elongated microwave guide configured to deliver microwave radiation energy to the resonant cavity with a vacuum wavelength λ width W , and the slit satisfying the relationship $W \leq \lambda/10$. These features produce results that are not taught or suggested by the references and which are new and unexpected.

In view of the foregoing, applicants respectfully submit that claim 1 and dependent claim 2, as well as independent claim 7, which recites features similar to claim 1, are allowable over the references cited and applied by the Examiner.

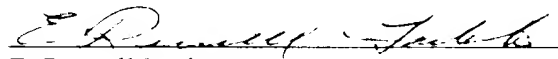
Consequently, early and favorable action allowing these claims and passing this case to issuance is respectfully solicited.

The Commissioner is authorized to charge any additional fees due by way of this Amendment, or credit any overpayment, to our Deposit Account No. 19-1090.

Respectfully submitted,

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